

U.S.S.N. 10/707,369

2

130123 (GEMS 0234 PA)

In the claims:

1. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising:

at least one electron collector body thermally coupled to an x-ray tube window and comprising;

at least one coolant circuit with a coolant inlet and a coolant outlet; and

at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device;

wherein said at least one electron collector body has a significantly large surface area that is disposed over and is approximately parallel with and is configured to correspond with orientation and surface area of a target surface area, and is configured and oriented to receive a significant amount of back-scattered electrons.

2. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising:

a first electron collector body and a second electron collector body thermally coupled to an x-ray tube window comprising;

at least one coolant circuit with a coolant inlet and a coolant outlet; and

at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device;

said first electron collector body and said second electron collector body non-integrally formed with each other.

U.S.S.N. 10/707,369

3

130123 (GEMS 0234 PA)

3. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising:

at least one electron collector body thermally coupled to an x-ray tube window and comprising;

at least one coolant circuit with a coolant inlet and a coolant outlet; and

at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, said at least one thermal exchange device is contained within said at least one electron collector body;

wherein at least a portion of said at least one thermal exchange device is curved.

4. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising:

at least one electron collector body thermally coupled to an x-ray tube window and comprising;

at least one coolant circuit with a coolant inlet and a coolant outlet; and

at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, at least a portion of said at least one thermal exchange device ~~being formed~~ comprising at least partially of a finless porous body material.

5. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising:

at least one electron collector body thermally coupled to an x-ray tube window and comprising;

U.S.S.N. 10/707,369

4

130123 (GEMS 0234 PA)

at least one coolant circuit with a coolant inlet and a coolant outlet;

a cavity; and

at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, ~~at least a portion of said at least one thermal exchange device being formed at least partially of a phase change material~~ and substantially filling said cavity.

6. (Original) An assembly as in claim 1 wherein said at least one thermal exchange device comprises:

a first thermal exchange device; and

a second thermal exchange device residing on a vacuum side of said first thermal exchange device.

7. (Original) An assembly as in claim 6 wherein said first thermal exchange device comprises a plurality of coolant channels and said second thermal exchange device comprises a porous material.

8. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising at least one electron collector body coupled to an x-ray tube window and comprising ~~at least one thermal exchange device formed at least partially of a~~ non-fin porous body material.

9. (Currently Amended) An x-ray tube window cooling assembly for an x-ray tube comprising at least one electron collector body coupled to an x-ray tube window and comprising a cavity at least partially filled with a body formed of ~~at least one thermal exchange device formed at least partially of a phase change material.~~

U.S.S.N. 10/707,369

5

130123 (GEMS 0234 PA)

10. (Original) An x-ray tube window cooling assembly for an x-ray tube comprising at least one thermal receptor thermally coupled to at least one electron collector body and an x-ray tube window, said at least one thermal receptor comprising at least one thermal exchange device.

11. (Original) An assembly as in claim 10 wherein said at least one thermal receptor further comprises at least one coolant circuit with a coolant inlet and a coolant outlet.

12. (Original) An assembly as in claim 11 wherein said at least one thermal exchange device is coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange devices.

13. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one electron collector body is formed of a conductive metallic material.

14. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one electron collector body is formed of copper.

15. (Original) An assembly as in any of claims 1, 3-5, 8-10, wherein said at least one electron collector body comprises:

- a first electron collector body; and
- a second electron collector body.

16. (Original) An assembly as in claim 15 wherein said first electron collector body is coupled to a first side of said x-ray tube window and said second electron collector body is coupled to a second side of said x-ray tube window.

U.S.S.N. 10/707,369

6

130123 (GEMS 0234 PA)

17. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one electron collector body is formed at least partially of a phase change material.

18. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one electron collector body is formed at least partially of a porous material.

19. (Currently Amended) An assembly as in any of claims 1-~~[[5]]~~3, 8-10, wherein said at least one thermal exchange device ~~[[are]]~~is selected from at least one of a porous body, a porous element, a channel, a pocket, a fin pocket, and a cooling fin.

20. (Currently Amended) An assembly as in any of claims 1-~~3~~, 5, 8-10, wherein said at least one thermal exchange device comprises a porous body formed of a material selected from at least one of a metal and a graphitic material.

21. (Currently Amended) An assembly as in any of claims 1-~~3~~, 5, 8-10, wherein at least a portion of said at least one thermal exchange device resides within a cavity of said at least one electron collector body.

22. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one thermal exchange device comprises at least one plenum.

23. (Original) An assembly as in any of claims 22 wherein said at least one plenum is divided uniformly.

U.S.S.N. 10/707,369

7

130123 (GEMS 0234 PA)

24. (Original) An assembly as in any of claims 22 wherein said at least one plenum is divided by at least one fin.

25. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one thermal exchange device have a diameter that is less than or equal to approximately 3mm.

26. (Currently Amended) An assembly as in any of claims 1-~~[[5]]~~ 3, 8-10, wherein said at least one thermal exchange device is formed at least partially of a phase change material and a porous material.

27. (Original) An assembly as in any of claims 1-5, 8-10, wherein said at least one thermal exchange device comprises:

a first thermal exchange device; and

a second thermal exchange device embedded in said first thermal exchange device.

28. (Original) An assembly as in any of claims 1-5, wherein coolant passing through said at least one coolant circuit is a high velocity coolant.

29. (Original) An assembly as in claims 28 wherein said high velocity coolant is formed at least partially of a fluid selected from at least one of water and a dielectric liquid.